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Sir:

Transmitted herewith for filing is the patent application of:

INVENTOR(S): YOSHIHIDE HAGIWARA

Title: PROCESS FOR THE PRODUCTION OF ALCOHOLIC COFFEE DRINKS

Enclosed are:
[ ] _____ sheets of drawings
[X] Executed Declaration/Power of Attorney
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[ ] This application is a continuation-in-part of copending application Serial No. _____, filed _____ and priority is claimed therefrom.

[X] Priority is claimed under 35 USC 119 based on:
Japanese Patent Application 291,206/96 filed October 15, 1996.

Respectfully submitted,

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PROCESS FOR THE PRODUCTION OF ALCOHOLIC COFFEE DRINKS

This invention relates to a process for the production of alcoholic drinks having a rich aroma of coffee by utilizing an extraction residue of roasted coffee beans which is yielded in large amounts in the making of instant coffee, coffee drinks and the like.

Instant coffee is usually made by subjecting roasted and ground coffee beans to multistage extraction at high temperature and high pressure in a tubular extractor, filtering the resulting highly concentrated extract, and cooling and spray-drying the filtrate. On the other hand, coffee drinks, as typified by canned coffee, are made by grinding roasted coffee beans, extracting the resulting powder with hot water or subjecting it to multistage extraction at high temperature and high pressure, and adding a sweetener, a perfume and an emulsifier to the resulting extract.

Thus, in the making of making of instant coffee and coffee drinks, a large amount of residue is left after coffee extract is prepared from roasted coffee beans. At present, there is no use for this extraction residue, so that most of it is dumped.

The present inventor has made an investigation on the effective utilization of an extraction residue of roasted coffee beans which is usually dumped. As a result, it has unexpectedly been found that, if an extraction residue of roasted coffee beans is supplemented with a saccharide and fermented with the aid of a yeast for the brewing of alcoholic liquors (e.g., wine yeast), the alcoholic fermentation causes the aroma of coffee to be developed again in spite of the substantial absence of coffee extract in the extraction residue used as the raw material, and an alcoholic drink having a rich aroma of coffee and an excellent taste is obtained.

The present invention has been completed on the basis of this finding.

Thus, the present invention provides a process for the production of alcoholic drinks which comprises the steps of adding a saccharide to an extraction residue of roasted coffee beans and fermenting the resulting mixture with the aid of a yeast for the brewing of alcoholic liquors.

The extraction residue of roasted coffee beans which is used as the raw material in the process of the present invention comprises grounds left after coffee extract is prepared from roasted coffee beans or a ground product thereof. Specific examples thereof include a residue left after roasted coffee beans or a ground product thereof is extracted with hot water or an aqueous solution of an alcohol such as methanol or ethanol; and a residue left after a hot water extract of roasted coffee beans is further extracted with an aqueous solution of an alcohol such as methanol or ethanol.

The extraction residue of roasted coffee beans consists essentially of polysaccharides, proteins, inorganic salts, caffeine and the like, and its content of carbon sources is insufficient for purposes of alcoholic fermentation. Accordingly, a saccharide serving as a carbon source is added to the extraction residue so as to provide a carbon-to-nitrogen (C/N) ratio suitable for alcoholic fermentation. For the purpose of supplementation with a carbon source, any saccharide that can be assimilated by the yeast used for fermentation may be employed without particular limitation. However, preferred examples thereof include glucose, fructose, sucrose, maltose, invert sugar, honey, fruit juice extract and blackstrap molasses. Although the amount of saccharide added may vary according to the type of the extraction residue used as the raw material, the type of yeast used, and other factors, it is generally used in

such a proportion that the weight ratio of the extraction residue of roasted coffee beans to the saccharide is in the range of 10/1 to 1/100 and preferably 5/1 to 1/50.

To the aforesaid extraction residue supplemented with the saccharide, other nutrients necessary for the growth of the yeast can further be added. Such nutrients include, for example, organic materials such as yeast extract, malt extract, defatted soybean meal, soybean flour, wheat bran extract, rice bran extract, defatted embryo buds, defatted corn meal and defatted peanut meal; and inorganic materials such as KH_2PO_4, $(NH_4)_2SO_4$ and $MgSO_4$. These ingredients are dissolved or dispersed in water to prepare a culture medium. Furthermore, in order to hydrolyze polysaccharides, proteins and like substances present in the extraction residue, hydrolases such as Biodiastase (trade name; manufactured by Amano Pharmaceutical Co., Ltd.) and Kleistase (trade name; manufactured by Daiwa Chemical Industry Co., Ltd.) may suitably be added to the culture medium.

On the other hand, the yeasts which can be used to ferment the aforesaid culture medium are yeasts commonly used in the brewing of alcoholic liquors such as wine, sake, beer and spirits (hereinafter referred to as alcoholic yeasts). Specific examples of sake yeast include stains of Saccharomyces cerevisiae such as Kyokai No. 6 yeast, Kyokai No. 7 yeast, Kyokai No. 9 yeast and Kyokai No. 11 yeast; specific examples of wine yeast include Saccharomyces cerevisiae W-3, S. cerevisiae KW-3 and S. cerevisiae OC-2; specific examples of beer yeast include top yeasts such as Saccharomyces cerevisiae IAM-4554 and various bottom yeasts; and specific examples of spirit yeast include strains of Saccharomyces cerevisiae such as Kyokai No. 2 spirit yeast. Among others, wine yeast is especially pre-

ferred.

In using such an alcoholic yeast, it is usually inoculated into malt juice, a solution of saccharified cereals, an extract of wheat bran, fruit juice or the like, and incubated at a temperature of about 5 to about 30℃, preferably about 10 to 25℃, for a period of about 2 to about 10 days to prepare a yeast culture in advance. Then, the aforesaid culture medium is inoculated with the yeast culture, usually in an amount of about 1 to about 20% by volume and preferably about 2 to about 10% by volume, and incubated at a temperature of about 2 to about 30℃ and preferably about 5 to about 25℃ until a desired alcohol concentration is reached, usually for a period of 5 to 20 days.

After completion of the fermentation, microbial cells and other insoluble materials are removed from the resulting culture by filtration, centrifugation or the like. The liquid so prepared may be treated according to a per se known procedure to obtain an alcoholic coffee drink. By way of example, this can be done by adding thereto a clarifying agent (e.g., bentonite or gelatin-tannin) at a concentration of about 0.01 to 2% by weight, stirring the resulting mixture, filtering it after the addition of a filter aid (e.g., celite or talc), and subjecting the filtrate to additional treatments (e.g., adjustment of alcohol content, pasteurization, and sterilization by filtration) as required.

The alcoholic coffee drinks produced according to the present invention cannot only be drunk as alcoholic beverages, but can also be used, for example, as alcoholic liquors for cooking use, as raw materials for the making of confectionery, and as ingredients of cocktails and refreshing drinks.

The present invention is more specifically explained with reference to the following examples.

Example 1

The spray-dried product (hereinafter referred to as COE) of an extraction residue left after the spray-dried product of a hot water extract of roasted coffee beans was extracted with a 70% aqueous solution of ethanol was used as a raw material. Using this raw material, culture media having the basic compositions shown in Table 1 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was centrifuged at 7,000 rpm for 10 minutes and the supernatant was recovered.

The color, smell and taste of the coffee wines so made were evaluated and their ethanol contents were measured. The results thus obtained are shown in Table 2. For purposes of preservation, they were sterilized by heating at 60℃ for 2 minutes.

Table 1

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	A-1	A-2
COE	1.0 g	1.5 g
Glucose	20 g	20 g
Total volume	100 ml	100 ml

Table 2

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
A-1	Coffee color	Coffee-like aroma	Coffee-like taste having sourness and sweetness	8.5%	3.7
A-2	Coffee color	Coffee-like aroma	Coffee-like taste having slight sweetness	8.7%	4.0

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 2

The spray-dried product (hereinafter referred to as COE) of an extraction residue left after the spray-dried product of a hot water extract of roasted coffee beans was extracted with a 75% aqueous solution of ethanol, and an enzyme-treated preparation (hereinafter referred to as COE-E) obtained by adding 0.02 g of Kleistase (trade name; manufactured by Daiwa Chemical Co., Ltd.) and 0.02 g of Biodiastase (trade name; manufactured by Amano Pharmaceutical Co., Ltd.) to 100 g of COE and incubating this mixture at 50℃ for 1 hour, were used as raw materials. Using these raw materials, culture media (B-1, B-2, C-1, C-2, 2B and 2C) having the basic compositions shown in Table 3 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was centrifuged at 7,000 rpm for 10 minutes and the supernatant was recovered. The color, smell and taste of the coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured.

The results thus obtained are shown in Table 4.

Table 3

Basic compositions of culture media
for the making of coffee wines

Composition of culture medium	B-1	B-2	C-1	C-2	2B	2C
COE	2.5 g	2.5 g	–	–	5 g	–
COE-E	–	–	2.5 g	2.5 g	–	5 g
Glucose	10 g	20 g	10 g	20 g	25 g	25 g
Total volume	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml

Table 4

Results of evaluation of coffee wines[*1]

Culture medium	Color	Smell	Taste	Ethanol content[**]	pH
B-1	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.5%	4.1
B-2	Coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8.7%	4.1
C-1	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.7%	4.2
C-2	Coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	9.1%	4.1
2B	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sweetness	10.8%	4.4
2C	Coffee color	Coffee-like aroma	Coffee-like vinous taste having somewhat strong sweetness	11.3%	4.4

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 3

The spray-dried product (hereinafter referred to as COM) of an extraction residue left after the spray-dried product of a hot water extract of roasted coffee beans was extracted with a 75% aqueous solution of methanol was used as a raw material. Using this raw material, culture media having the basic compositions shown in Table 5 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was centrifuged at 7,000 rpm for 10 minutes and the supernatant was recovered.

The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 6.

Table 5

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	D-1	D-2
COM	1.0 g	1.5 g
Glucose	20 g	20 g
Total volume	100 ml	100 ml

Table 6

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
D-1	Coffee color	Coffee-like aroma	Coffee-like taste having sourness and sweetness	8.2%	3.8
D-2	Coffee color	Coffee-like aroma	Coffee-like taste having slight sweetness	8.3%	4.1

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 4

The spray-dried product (hereinafter referred to as COM) of an extraction residue left after the spray-dried product of a hot water extract of roasted coffee beans was extracted with a 80% aqueous solution of methanol, and an enzyme-treated preparation (hereinafter referred to as COM-E) obtained by adding 0.02 g of Kleistase (trade name; manufactured by Daiwa Chemical Co., Ltd.) and 0.02 g of Biodiastase (trade name; manufactured by Amano Pharmaceutical Co., Ltd.) to 100 g of COM and incubating this mixture at 50℃ for 1 hour, were used as raw materials. Using these raw materials, culture media (E-1, E-2, F-1, F-2, 2E and 2F) having the basic compositions shown in Table 7 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was centrifuged at 7,000 rpm for 10 minutes and the supernatant was recovered. The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 8.

Table 7

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	E-1	E-2	F-1	F-2	2E	2F
COM	2.5 g	2.5 g	–	–	5 g	–
COM-E	–	–	2.5 g	2.5 g	–	5 g
Glucose	10 g	20 g	10 g	20 g	25 g	25 g
Total volume	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml

Table 8

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
E-1	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5. 2%	4. 0
E-2	Coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8. 3%	4. 1
F-1	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5. 5%	4. 1
F-2	Coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8. 7%	3. 8
2E	Coffee color	Coffee-like aroma	Coffee-like vinous taste having sweetness	10. 8%	4. 3
2F	Coffee color	Coffee-like aroma	Coffee-like vinous taste having somewhat strong sweetness	10. 2%	4. 2

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 5

The dry powder (hereinafter referred to as COBE) of an extraction residue left after roasted coffee beans were extracted with a 75% aqueous solution of ethanol was used as a raw material. Using this raw material, culture media having the basic compositions shown in Table 9 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 2 g/l of malt extract powder, 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was filtered through Toyo No. 5B filter paper (manufactured by Advantec Toyo Kaisha, Ltd.).

The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 10.

Table 9

Basic compositions of culture media
for the making of coffee wines

Composition of culture medium	G-1	G-2
COBE	1.0 g	1.5 g
Glucose	20 g	20 g
Total volume	100 ml	100 ml

Table 10

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
G-1	Light coffee color	Coffee-like aroma	Coffee-like taste having sourness and sweetness	7.8%	4.1
G-2	Light coffee color	Coffee-like aroma	Coffee-like taste having slight sweetness	8.2%	4.0

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 6

The dry powder (hereinafter referred to as COBE) of an extraction residue left after roasted coffee beans were extracted with a 70% aqueous solution of ethanol, and an enzyme-treated preparation (hereinafter referred to as COBE-E) obtained by adding 0.02 g of Kleistase (trade name; manufactured by Daiwa Chemical Co., Ltd.) and 0.02 g of Biodiastase (trade name; manufactured by Amano Pharmaceutical Co., Ltd.) to 100 g of the dry powder and incubating this mixture at 70℃ for 1 hour, were used as raw materials. Using these raw materials, culture media (H-1, H-2, I-1, I-2, 2H and 2I) having the basic compositions shown in Table 11 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 2 g/l of malt extract powder, 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was filtered through Toyo No. 5B filter paper (manufactured by Advantec Toyo Kaisha, Ltd.). The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 12.

Table 11

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	H-1	H-2	I-1	I-2	2H	2I
COBE	2.5 g	2.5 g	–	–	5 g	–
COBE-E	–	–	2.5 g	2.5 g	–	5 g
Glucose	10 g	20 g	10 g	20 g	25 g	25 g
Total volume	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml

Table 12

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
H-1	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.2%	4.0
H-2	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8.3%	4.2
I-1	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.1%	4.1
I-2	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8.7%	4.2
2H	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sweetness	10.2%	4.1
2I	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having somewhat strong sweetness	11.5%	4.1

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 7

The dry powder (hereinafter referred to as COBM) of an extraction residue left after roasted coffee beans were extracted with a 75% aqueous solution of methanol was used as a raw material. Using this raw material, culture media having the basic compositions shown in Table 13 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 2 g/l of defatted soybean meal, 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was filtered through Toyo No. 5B filter paper (manufactured by Advantec Toyo Kaisha, Ltd.).

The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 14.

Table 13

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	J-1	J-2
COBM	1.0 g	1.5 g
Glucose	20 g	20 g
Total volume	100 ml	100 ml

Table 14

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
J-1	Light coffee color	Coffee-like aroma	Coffee-like taste having sourness and sweetness	8.3%	3.8
J-2	Light coffee color	Coffee-like aroma	Coffee-like taste having slight sweetness	8.2%	4.0

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 8

The dry powder (hereinafter referred to as COBM) of an extraction residue left after roasted coffee beans were extracted with a 80% aqueous solution of ethanol, and an enzyme-treated preparation (hereinafter referred to as COBM-E) obtained by adding 0.02 g of Kleistase (trade name; manufactured by Daiwa Chemical Co., Ltd.) and 0.02 g of Biodiastase (trade name; manufactured by Amano Pharmaceutical Co., Ltd.) to 100 g of COBM and incubating this mixture at 70℃ for 1 hour, were used as raw materials. Using these raw materials, culture media (K-1, K-2, L-1, L-2, 2K and 2L) having the basic compositions shown in Table 15 below were prepared, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 2 g/l of defatted embryo bud extract powder, 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. Each culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, each culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 5 days. After completion of the fermentation, the resulting culture was filtered through Toyo No. 5B filter paper (manufactured by Advantec Toyo Kaisha, Ltd.). The coffee wines so made were evaluated by organoleptic tests and their ethanol contents were measured. The results thus obtained are shown in Table 16.

Table 15

Basic compositions of culture media for the making of coffee wines

Composition of culture medium	K-1	K-2	L-1	L-2	2K	2L
COBM	2.5 g	2.5 g	–	–	5 g	–
COBM-E	–	–	2.5 g	2.5 g	–	5 g
Glucose	10 g	20 g	10 g	20 g	25 g	25 g
Total volume	100 ml	100 ml	100 ml	100 ml	100 ml	100 ml

Table 16

Results of evaluation of coffee wines*

Culture medium	Color	Smell	Taste	Ethanol content**	pH
K-1	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.2%	4.0
K-2	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8.3%	4.2
L-1	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sourness	5.5%	4.1
L-2	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having slight sweetness	8.7%	4.2
2K	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having sweetness	10.1%	4.2
2L	Light coffee color	Coffee-like aroma	Coffee-like vinous taste having somewhat strong sweetness	10.2%	4.2

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

Example 9

A basal culture medium was prepared from 2 g/100 ml of an extraction residue left after a ground product of roasted coffee beans was extracted with hot water and 25 g/100 ml of glucose, and 2 g/l of yeast extract (manufactured by DIFCO LABORATORIES Co.), 2 g/l of defatted embryo bud extract powder, 1 g/l of KH_2PO_4 (manufactured by Hayashi Pure Chemical Industry Co., Ltd.), 0.5 g/l of $(NH_4)_2SO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) and 0.24 g/l of $MgSO_4$ (manufactured by Hayashi Pure Chemical Industry Co., Ltd.) were added thereto. The resulting culture medium was adjusted to a pH of about 5.2 with 1N hydrochloric acid, and 80 ml of it was poured into a 100 ml Erlenmeyer flask and sterilized under pressure at 121℃ for 15 minutes. Then, the culture medium was inoculated with wine yeast (Saccharomyces cerevisiae) and incubated at 20-22℃ for 7 days. After completion of the fermentation, the resulting culture was filtered through Toyo No. 5B filter paper (manufactured by Advantec Toyo Kaisha, Ltd.). The coffee wine so made was evaluated by organoleptic tests and its ethanol content was measured. The results thus obtained are shown in Table 17.

Table 17

Test results of novel coffee wine*

Color	Smell	Taste	Ethanol content**	pH
Light coffee color	Coffee-like aroma	Coffee-like taste having sourness and sweetness	10.5%	4.0

* Average values for 2 samples.

** Ethanol was determined according to the distillation method described in An Explanation of the Twelfth Revised Japanese Pharmacopoeia, General Principles, Common Rules for Pharmaceutical Preparations, General Testing Methods, B-11 (1991, Hirokawa Shoten).

CLAIMS

1. A process for the production of alcohol coffee drinks which comprises the steps of adding a saccharide to an extraction residue of roasted coffee beans and fermenting the resulting mixture with the aid of a yeast for the brewing of alcoholic liquors.

2. The process of claim 1 wherein the extraction residue of roasted coffee beans comprises grounds left after coffee extract is prepared from roasted coffee beans or a ground product thereof.

3. The process of claim 1 wherein the saccharide is selected from the group consisting of glucose, fructose, sucrose, maltose, invert sugar, honey, fruit juice extract and blackstrap molasses.

4. The process of claim 1 wherein the saccharide is added in such a proportion that the weight ratio of the extraction residue of roasted coffee beans to the saccharide is in the range of 10/1 to 1/100.

5. The process of claim 1 wherein the yeast for the brewing of alcoholic drinks is cultured in a nutrient solution containing, in addition to of the extraction residue of roasted coffee beans to the saccharide, other nutrients necessary for the growth of the yeast.

6. The process of claim 5 wherein a hydrolase is further added to the nutrient solution.

7. The process of claim 1 wherein the yeast for the brewing of alcoholic drinks is wine yeast (Saccharomyces cerevisiae).

8. An alcoholic coffee drink produced by the process of claim 1.

Abstract of the Disclosure

This invention provides a process for the production of alcohol coffee drinks which comprises the steps of adding a saccharide to an extraction residue of roasted coffee beans and fermenting the resulting mixture with the aid of a yeast for the brewing of alcoholic liquors. According to this process, alcoholic drinks having a rich aroma of coffee can be produced.

Dkt. No._____

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name.
I believe I am the original, first and sole inventor (*if only one name is listed below*) or an original, first and joint inventor (*if plural names are listed below*) of the subject matter which is claimed and for which a patent is sought on the invention entitled
PROCESS FOR THE PRODUCTION OF ALCOHOLIC COFFEE DRINKS
_____, the specification of which:

(check one) ☒ is attached hereto ☐ was filed on _____ as Application Serial No. _____ and was amended on _____ *(if applicable)*

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.
I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56.
I hereby claim foreign priority benefits under 35 U.S.C. §119(a)-(d) or §365(b) of any foreign application(s) for patent or inventor's certificate, or §365(a) of any PCT international application which designated at least one country other than the United States, listed below and have also identified below any foreign application for patent or inventor's certificate, or PCT international application having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed
291,206/96 (NUMBER)	Japan (COUNTRY)	15/10/1996 (FILED D/M/Y)	☒ YES ☐ NO
_____ (NUMBER)	_____ (COUNTRY)	_____ (FILED D/M/Y)	☐ YES ☐ NO

I hereby claim the benefit under 35 U.S.C. §119(e) of any United States provisional application(s) listed below.

_____ (APPLICATION NUMBER) _____ (FILING DATE)

_____ (APPLICATION NUMBER) _____ (FILING DATE)

I hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or §365(c) of any PCT international application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT international application in the manner provided by the first paragraph of 35 U.S.C. §112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR §1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(APPLICATION SERIAL NO.)	(FILING DATE)	(STATUS)
(APPLICATION SERIAL NO.)	(FILING DATE)	(STATUS)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorneys and/or agents to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

Leonard W. Sherman	Reg. No. 19,636	Alan Holler	Reg. No. 29,266
Edwin A. Shalloway	Reg. No. 19,967	Karl Hoback	Reg. No. 23,026
Richard A. Steinberg	Reg. No. 26,588	Robert L. Haines	Reg. No. 35,533
Perry Carvellas	Reg. No. 19,637		

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine and imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or document or any patent issuing thereon.

Full name of sole or first inventor: Yoshihide (GIVEN NAME) (MIDDLE NAME) HAGIWARA (FAMILY NAME)

Inventor's signature: Yoshihide Hagiwara

Date of signature: September 8, 1997

Residence: Takarazuka-shi (CITY) Hyogo-ken (STATE OR PROVINCE) Japan (COUNTRY)

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Date of signature:

Residence: (CITY) (STATE OR PROVINCE) (COUNTRY)

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Full name of third inventor: (GIVEN NAME) (MIDDLE NAME) (FAMILY NAME)

Inventor's signature:

Date of signature:

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Citizenship:

Post Office Address (insert complete mailing address, including country):

☐ ADDITIONAL INVENTORS ARE BEING NAMED ON SEPARATELY NUMBERED SHEETS ATTACHED HERETO

Applicant or Patentee: YOSHIHIDE HAGIWARA Attorney's
Serial or Patent No.: Docket No.:
Filed or Issued:
For: PROCESS FOR THE PRODUCTION OF ALCOHOLIC COFFEE DRINKS

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS (37 CFR 1.9(f) AND 1.27(b)) - INDEPENDENT INVENTOR

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees under 35 U.S.C. §41(a) and (b), to the Patent and Trademark Office with regard to the invention described in

[X] the specification filed herewith as identified above.
[ ] the application identified above.
[ ] the patent identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

[X] no such person, concern, or organization
[ ] persons, concerns or organizations listed below*

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

FULL NAME
ADDRESS
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

FULL NAME
ADDRESS
[ ] INDIVIDUAL [ ] SMALL BUSINESS CONCERN [ ] NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

YOSHIHIDE HAGIWARA		
NAME OF INVENTOR	NAME OF INVENTOR	NAME OF INVENTOR
Yoshihide Hagiwara		
Signature of Inventor	Signature of Inventor	Signature of Inventor
September 8, 1997		
Date	Date	Date